

**PORTABLE LIGHT WEIGHT DESK ENABLING
MULTIPLE USER POSITIONS**

5 FIELD OF INVENTION

The present invention relates to portable and adjustable desks or support structures, and in particular, to a portable and adjustable desk or support structure permitting multiple user positions while supporting an object.

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**BACKGROUND OF INVENTION AND BRIEF DESCRIPTION
OF THE PRIOR ART**

Portable and/or foldable tables have existed to provide users with an easily foldable/unfoldable table structure that provides table surfaces for a wide variety of uses and purposes and convenience to the users. These tables may be typically used at places or locations where conventional tables cannot be used. Such tables are used for working, reading/writing, eating, or any other purposes. Common uses of such tables are for placing and supporting laptop or portable computers, books, plates, bowls, or any other such items.

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For example, laptop or portable computers are used by various persons. Laptop computer users often prefer to use their portable computers while sitting in a comfortable chair/couch or while sitting up or lying in a bed. These locations, however, typically require a table or desk on which the computer is placed, or the user must position the computer on his or her lap. Supporting a portable computer on the user's lap is awkward or uncomfortable and causes heat, sweat, muscle fatigue, etc. to the user. Therefore, portable computer users generally prefer to use some type of portable table, stand, support device, or other flat, rigid surface upon which the computer is placed.

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U.S. Pat. Nos. 1,719,614; 2,449,492; 2,476,620; 3,805,710; 4,119,289; 4,726,556; 5,417,168; and 6,019,050 disclose examples of such portable and/or adjustable tables or support structures. However, there are various problems and disadvantages with these prior art portable tables or support structures. Some of these prior art tables and support structures are uncomfortable and bulky to use, cumbersome to set up, or not easily or variably adjustable to accommodate the different positions in which the user may use the table and support structures such as lying in bed, sitting at a conventional table or seated in a vehicle.

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Some of the prior art tables and support structures required attachment or coupling to another surface or structure in order to be used. Portable tables and support structures that are collapsible and folding and self-supporting and self-standing have been developed and exist in the prior art. U.S. Pat. Nos. 2,476,620; 3,805,710; 4,726,556; 5,417,168 disclose examples of such self-supporting or self-standing, collapsible tables and support structures. However, one problem with these self-supporting,

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collapsible prior art tables is that the legs or leg components are not able to be easily folded together since one leg or leg component would get in the way of rotation or folding of the other leg or leg component when the legs or leg components were being placed into a storage position. The folded legs were therefore bulky, or one of
5 the legs needed to be removed in order to fold or place the legs in a compact position. Therefore, the need and desire exists to develop and provide a leg assembly for a table or support structure wherein the leg components stay coupled to the leg assembly and wherein the leg components are able to be put into a folding position and rotate or fold easily out of the way of each other when being folded to a compact
10 storage position and are able to rotate back to an unfolding position for use.

Also, some of the prior art tables or support structures have foldable or collapsible legs or leg assemblies that may not be very stable or balanced when in use. Therefore, collapsible truss structures or collapsible triangular shaped leg components have
15 been developed and used for various tables and support structures. U.S. Pat. Nos. 3,164,353 and 4,726,556 provide examples of such legs or leg assemblies. U.S. Pat. No. 3,164,353 is further incorporated by reference herein. However, one problem with these legs or leg assemblies is that the stability, balance, and center of gravity position of the table or support structure may become less stable as the table or
20 support surface is raised or lowered to a various position. Therefore, the need and desire exists to develop and provide a leg assembly for a table or support structure wherein the legs or leg components and the center of gravity position of the leg assembly remain generally stable and balanced whether the table or support structure surface is raised or lower.

Furthermore, prior art tables or support structures that allow for height adjustment exist in order to accommodate the user. U.S. Pat. Nos. 2,449,492; 2,476,620; 3,805,710; 4,119,289; 4,726,556; 5,417,168 provide examples of such height
25 adjustable tables or support structures. However, some of the prior art height adjustment mechanisms for these tables or support structures are cumbersome, awkward, or difficult to use. U.S. Pat. No. 5,417,168 discloses a height adjustment mechanism that uses an engaging protuberance to one of a number of height adjustment holes in order to adjust the height of each leg component.
30 However, this height adjustment mechanism has the problem of aligning the engaging protuberance to a certain/desired height adjustment hole. Therefore, the need and desire exists to develop and provide a height adjustment mechanism for a table or support structure that is easily accessible and easy to use to adjust height of the table and able to easily align and engage the engaging protuberance into a certain/desired height adjustment hole.

40 A further limitation of the prior art tables or support structures is that they do not explicitly teach or disclose legs or leg components that are independently adjustable to conform the plane of the table or support structure surface to even and uneven surfaces (i.e. bed or mattress surface or any other such even/uneven surfaces). Another
45 limitation of the prior art tables or support structures is that they do not adjust to the size and height of the user in that the width distance apart from the legs or leg

components are not adjustable when the height of the table or support structure surface is lowered or raised. Also, a mechanism for adjusting the angle or pitch of the table or support structure surface is in continual need of improvement and development.

- 5 Therefore, the present invention discloses and provides a portable and configurable desk top to enable multiple user positions that overcomes the above problems, disadvantages, and limitations of the prior art.

SUMMARY OF THE INVENTION

- 10 It is an object of this invention to provide a light weight portable desk surface that is adjustable to enable multiple user positions while supporting an object such as a laptop computer or other electronic device or including a book or a food tray.
It is an object of this invention to provide a portable light weight desk surface that can easily be mounted with wheels.

- 15 The present invention is directed to a portable desk top frame structure for supporting an object comprising:

- a plurality of lateral members;
- a plurality of transverse members,
- 20 at least two of said transverse members each connected to at least one of said lateral members to form said frame structure;
- at least a first and second support member connected transversely to at least one of said lateral members;
- at least a third support member connected transversely to at least one other of
- 25 said at least one lateral members,
- said first, second and third support members oriented so as to stably support said frame structure on a surface,
- said frame structure inclined to said surface at an angle ergonomically suitable for a user of the object supported on said frame structure.

- 30 In a variation of the present invention, the present invention is directed to a portable desk top frame structure for supporting an object comprising:

- a plurality of lateral members;
- a plurality of transverse members,
- 35 at least two of said transverse members each connected to at least one of said lateral members to form said frame structure;
- at least a first and second support member connected transversely to at least one of said lateral members;
- at least a third support member connected transversely to at least one other of
- 40 said at least one lateral members,
- said first and second support members oriented so as to stably support said frame structure on a surface,
- said at least a third support member oriented in combination with said first and second support members to stably support said frame structure on another
- 45 surface,

said frame structure inclined to said surface at an angle ergonomically suitable for a user of the object supported on said frame structure.

In the variation of the portable desk top frame structure, at least one of said first and second support members is oriented so as to stably support said frame structure on a surface comprises a wheel and axle assembly.

In another variation of the present invention, at least one of said first, second and third support members comprises at least one positionally adjustable joint for adjusting the position of said frame structure with respect to the surface.

In another variation of the present invention, at least one of said first, second and third support members comprises at least one positionally adjustable joint for adjusting the position of said frame structure with respect to the respective surface.

The frame structure can further comprise a covering material interfacing with at least a portion of said frame structure.

An alternate configuration of the first embodiment of the present invention comprises a portable desk top frame structure for supporting an object, with the frame structure comprising: a plurality of members connected in one of a (a) polygonal and (b) curvilinear arrangement to form the frame structure; at least one connection for a plurality of support members, with the at least one connection oriented to enable the plurality of support members to stably support the frame structure on at least one surface. The plurality of support members enable the frame structure to be inclined to the at least one surface at an angle ergonomically suitable for a user of the object to be supported on the frame structure.

In another alternate configuration, the frame structure comprises a plurality of members connected in at least one of a (a) polygonal and (b) curvilinear arrangement to form the frame structure; at least one connection for a plurality of support members, with the at least one connection oriented to enable at least one of the plurality of support members to stably support the frame structure on a first surface. The at least one connection is oriented to enable another of the plurality of support member to be oriented to stably support the frame structure on a second surface. The frame structure is inclined to the surface at an angle ergonomically suitable for a user of the object supported on the frame structure.

A second embodiment of the present invention is a portable desk top frame structure for supporting an object, the desk top frame structure being formed uniformly and integrally in at least one of a (a) polygonal and (b) curvilinear arrangement to form the frame structure. The desk top frame structure comprises: at least one connection for a plurality of support members, the at least one connection oriented to enable the plurality of support members to stably support the frame structure on at least one surface, the plurality of support members enabling the frame structure to be inclined to the at least one

surface at an angle ergonomically suitable for a user of the object to be supported on the frame structure.

- 5 In an alternate configuration of the second embodiment, the desk top frame structure is formed uniformly and integrally in one of a (a) polygonal and (b) curvilinear arrangement to form the frame structure. The desk top frame structure comprises: at least one connection for a plurality of support members, the at least one connection oriented to enable at least another of the plurality of support members to stably support the frame structure on a first surface. The at least one connection is oriented to enable at least another support member to be oriented to stably support the frame structure on a second surface enabling the frame structure to be inclined to the surface at an angle ergonomically suitable for a user of the object supported on the frame structure.
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- 15 At least one of the plurality of support members can comprise a wheel and axle assembly.
- 20 At least one of the plurality of support members can comprise at least one positionally adjustable joint for adjusting at least one of the (a) position of the frame structure with respect to at least one surface and (b) angle of the frame structure with respect to at least one surface.
- 25 In another variation of the portable desk top frame structure, at least another of the plurality of support members is oriented to enable the plurality of support members to stably support the frame structure on at least one surface are disposed to enable at least two users to be seated at least partially under the frame structure simultaneously.
- 30 The portable desk top frame structure can further comprise at least one member disposed so as to connect or join at least two portions of the frame structure.
- 35 The portable desk top frame structure can further comprise at least another member disposed so as to connect at least another portion of the frame structure, wherein at least another member and at least one member disposed so as to connect at least two portions of the frame structure are connected or joined to each other.
- 40 The portable desk top structure can further comprise a grating matrix formed uniformly and integrally with the frame structure, and can further comprise a covering material interfacing with at least a portion of the frame structure. The covering material can be disposed to interface also with the object to be supported.
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At least one of the plurality of support members of the portable desk top frame structure can further comprise a stabilizer bar. At least a portion of the stabilizer bar can be rotated to be at least partially parallel or be rotated circumferentially with respect to the plurality of support members. The stabilizer bar can further comprise at least one positionally adjustable joint for extending the span of the stabilizer bar.

The portable desk top frame structure can further comprise a raised surface enabling the user to ergonomically position an arm or wrist of the user. The raised surface can be integrally formed with the frame structure or the raised surface can be joined to the portable desk top frame structure by a joining means for joining the raised surface to the portable desk top structure.

The frame structure can further comprise connection means for connecting supporting means enabling support of the frame structure by one of (a) the body of a user and (b) a surface other than a floor on which a user is located. The connection means for connecting supporting means can comprise a strap-engaging means for engaging a strap.

20 BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevation view of the embodiment of the present invention of a portable adjustable desk.

FIG. 2 is a perspective view of the embodiment of the present invention of a portable adjustable desk.

FIG. 3 is a perspective view of a first alternate configuration of the embodiment of the present invention of a portable adjustable desk.

FIG. 4A is an elevation view of a second alternate configuration of the embodiment of the present invention of a portable adjustable desk.

FIG. 4B is an elevation view of a variation of the second alternate configuration of the present invention of a portable adjustable desk.

FIG. 5 is a variation of the embodiment of the present invention of a portable adjustable desk.

FIG. 6A is an elevation view of a configuration of a covering for the desk top surface of the embodiment of the present invention of a portable adjustable desk.

FIG. 6B is an elevation view of a variation of the covering for the desk top surface of the embodiment of the present invention of a portable adjustable desk of FIG. 6A.

FIG. 6C is an elevation view of a second variation of the covering for the desk top surface of the embodiment of the present invention of a portable adjustable desk.

FIG. 7 is an elevation view of an alternate covering for the desk top surface of the embodiment of the present invention of a portable adjustable desk of the present invention.

FIG. 8 is an elevation view of the covering of FIG. 6A as covering the desk top surface of the embodiment of the present invention.

FIG. 9A is a plan view of the first alternate configuration of a second embodiment of the present invention.

- FIG. 9B is a plan view as viewed from the bottom of the first alternate configuration of the second embodiment of the present invention of FIG. 9A.
- FIG. 9C is an elevation view as viewed from the side of the of first alternate configuration of the second embodiment of the present invention of FIG. 9A.
- 5 FIG. 9D is an elevation view as viewed from the rear of the first alternate configuration of the second embodiment of the present invention of FIG. 9A.
- FIG. 9E is a perspective view of the first alternate configuration of the second embodiment of the present invention of FIG. 9A.
- 10 FIG. 10A is a plan view of the second alternate configuration of the second embodiment of the present invention.
- FIG. 10B is a plan view as viewed from the bottom of the second alternate configuration of the second embodiment of the present invention of FIG. 10A.
- FIG. 10C is an elevation view of a portion of the second alternate configuration of the second embodiment of the present invention of FIG. 10A.
- 15 FIG. 10D is an elevation view of an alternate position of the portion of the second alternate configuration of the second embodiment of the present invention of FIG. 10A.
- FIG. 10E is an elevation view as viewed from the side of the second alternate configuration of the second embodiment of the present invention of FIG. 10A.
- 20 FIG. 10F is an elevation view as viewed from the rear of the second alternate configuration of the second embodiment of the present invention of FIG. 10A.
- FIG. 10G is a perspective view of the second alternate configuration of the second embodiment of the present invention of FIG. 10A.
- FIG. 11A is a plan view of a third alternate configuration of the second embodiment of the present invention.
- 25 FIG. 11B is a plan view as viewed from the bottom of the third alternate configuration of the second embodiment of the present invention of FIG. 11A .
- FIG. 11C is a perspective view of the third alternate configuration of the second embodiment of the present invention of FIG. 11A
- 30 FIG. 11D is a perspective view as viewed from the bottom of the third alternate configuration of the second embodiment of the present invention of FIG. 11C.
- FIG. 11E is an elevation view as viewed from the rear of the third alternate configuration of the second embodiment of the present invention of FIG. 11A .
- FIG. 11F is an exploded view of a portion of the third alternate configuration of the second embodiment of the present invention of FIG. 11A.
- 35 FIG. 12A is a perspective view of a third embodiment of the present invention.
- FIG. 12B is a perspective view of a detail of the third embodiment of the present invention of FIG. 12A.
- FIG. 12C is perspective view of a detail of the third embodiment of the present invention of FIG. 12B.
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DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

- FIG. 1 is a plan view of the upper surface of desk top frame structure 500 of the present invention with respect to an arbitrary set of xyz axes with the x and y axes
- 45 forming a plane in the plan view and the z axis extends vertically perpendicular to the xy plane. The xy plane is inclined from the horizontal by an angle θ from the

horizontal as shown in FIG. 2. The angle θ is chosen to maximize ergonomic comfort. The desk top frame structure 500 comprises at least two members 510 and 512 parallel to the y direction. In the x direction, the members 520 and 522 are joined by a 4-sided cross connection 530 while members 524 and 526 are joined by tee connection 532.

5 The x-direction members 520 and 524 intersect with y-direction member 510 by means of tee connections 534 and 536 while members 522 and 526 intersect with y-direction member 512 by means of connections 538 and 540.

Optional tee connection 538A can be provided between tee connection 536 and member 510, while optional tee connection 538B can be provided between tee connection 540 and member 512. The perpendicular connections of the optional tees 537A and 537B face in the z-direction toward the upper surface of the desk structure frame 500, as shown by the perpendicular connections 537a and 537b of the tees 537A and 537B, respectively, which act as stopping mechanisms to minimize the chances that any item placed by the user on the desk top frame structure will slide off.

15 A y-direction member 542 is connected to tee 544 which in turn is connected to tee 546. Tee 546 is in turn connected to cross 530. The perpendicular connections 544a of tee 544 and 546a of tee 546 are each oriented downward in the z direction. Connections 550 to tee 536 and connection 552 to tee 540 are shown as tees to provide optional capability to connect wheels and other accessories as shown and discussed later in FIGS 4A and 4B. However, those skilled in the art recognize that tee connections 550 and 552 can be substituted by elbows. The perpendicular connections 550a of tee 550 and 552a of tee 552 are in turn connected to one end of support members 554 and 556 respectively whose opposite ends can be in contact with a floor or the ground depending upon the user's desired usage of the device.

25 Tee connection 558 is connected to cross 530. Tee connection 558 provides dual capability for connecting a third support member 560. The third support member 560 can be oriented either by connection to the perpendicular connection 558a of tee 558 or to the in-line connection 558b of tee 558.

30 Optional locking mechanisms 508 can be located at suitable locations as shown to strengthen the desk top frame structure 500.

FIG. 2 is a perspective view of the desk top frame structure 500 of FIG. 1. The identical component numbers are used and are not otherwise further described herein unless necessary. The only difference between FIG. 2 and FIG. 1 is that the third support member 560 is connected to an optional tee 562 at perpendicular connection 562a. The orientation of tee 562 in the horizontal position as shown improves the stability of desk top frame structure 500.

40 In FIG. 3 is illustrated an alternate configuration of the embodiment as shown in FIG. 1. In this configuration, the third support member 560 and tee 562 are rearranged by removal from end 558a of connecting tee 558 to connect instead to the end 558b of the tee 558. In this configuration, the user can comfortably place an object on the desk top surface 500 while in a vehicle or other confined space by resting the third support member 560 and as appropriate tee 562 on a suitable surface.

In FIG. 4A is illustrated the alternate configuration of the embodiment of FIG. 3 further altered by removing the end tees 550 and 552 and the members 554 and 556. Wheel axles 570A and 570B connecting wheels 572A and 572B, respectively, are attached to the end of tees 536 and 540 as shown. Optional additional locking mechanisms 508 can be attached to the tees 536 and 540 as shown. The third support member 560 now acts as handle which can be extended in length as necessary to enable a user to transport items located on the surface of the frame structure 500.

FIG. 4B is a variation of the alternate configuration of FIG. 4A where the tees 550 and 552 remain in place and the connecting members 554 and 556 are just swiveled to an upright position to permit the wheels 572A and 572B to be connected now to the tees 554 and 556 through the wheel axles 570A and 570B. This configuration also enables a user to transport items located on the surface of the frame structure 500 without the necessity of storing the members 554 and 556 and the tees 550 and 552.

In FIG. 5 is illustrated a sideways perspective view of the desk top frame structure 500 which is shown with respect to the arbitrary coordinate axes xyz as being inclined at an angle θ . That is, the xy plane is inclined to the horizontal by angle θ . The angle θ is chosen for ergonomic reasons and typically ranges from 30° to 45° but is not limited to this range. In a variation of the embodiment, the support member 811 is shown which comprises a plurality of members such as 820, 830, 840 and 845 which can be pivoted with respect to each other in the yz plane by means of the tighteners 825 and 835. For example, the tightener 825 permits a pivot angle ϕ in the yz plane as shown between member 820 and member 830. The member 820 can be connected by means of adjustable locking collar 850 to any of the connections 530, 546 or 544. However, typically to obtain maximum support and stability of the item to be supported by the desk top frame, the locking collar 850 is connected either to the cross 530 or the tee 546. This configuration enables the user to make additional adjustments to the orientation of the frame structure 500. The member 840 can further comprise a telescoping member 845 to positionally adjust the position of the frame structure 500 with respect to the respective supporting surface. The telescoping member 845 can in turn can be constructed with a horizontal stabilizer bar 860. The horizontal stabilizer bar 860 in turn can be comprised of two or more flaps 860A and 860B which pivot or rotate partially or completely upward and downward or circumferentially in a manner similar to the handles of a periscope. This pivoting or rotation facilitates storage of the telescoping member 845 and also adjustment of the frame structure 500 for use on uneven surfaces.

The support member 812 comprises a plurality of members such as 870, 880 and 885 which also can be pivoted with respect to each other by means of tighteners 865 and 875. However, tightener 865 comprises a ball joint which allows motion in any direction whereas member 870 is connected to the desk top frame structure 500 by means of tightener 865 which permits pivoting in the yz plane as discussed above. Member 870 is connected to support member 880 by tightener 875 which also permits

pivoting in the yz plane. The member 885 is a telescoping member which is formed with the member 880.

5 The third support member 813 which is primarily hidden also comprises a plurality of members in a similar manner which is obvious to those skilled in the art to be as shown and discussed for support member 812.

10 FIGS. 6A, 6B and 6C illustrate alternate configurations of a covering which interfaces over the desk top frame structure 500. In FIG. 6A is a one-piece mesh suitably sized to span the dimensions outlined by members 510 and 512 and also by members 520, 522, 524 and 526. In FIG. 6B is a two-piece configuration of the mesh 610 divided into pieces 612A and 612B which are joined by hinges 614 located at suitable locations. In FIG. 6C is four-piece configuration of the mesh 610 divided into four pieces 616A to 616D. Again, hinges 614 are placed at suitable locations. The mesh material can be made of any suitable material such as a metal or plastic. Those skilled in the art recognize that any number of divided pieces of mesh can be provided. The purpose of the multiple pieces of mesh is to enable a user to easily fold the mesh for transportation of the desk top structure.

20 FIG. 7 illustrates another covering 710 which can be used either alone or jointly with the mesh 610, 612A, 612B, and 616A to 616D of FIGS. 6A to 6C. Covering 710 is a mesh permitting air flow to facilitate heat transfer when a laptop computer or other electronic device is located on the desk top frame structure 500. Mesh covering 710 typically can include ULTRA GRIP LINER™ made by the Con-Tact Corp.

25 FIG. 8 is an elevation view of the covering of FIG. 6A as covering the desk top surface of the embodiment of the present invention. The mesh 612, or 610, 612A, 612B and 616A to 616D can be applied to the desktop frame structure 500 typically by fastening means such clips 810. In addition, the covering 710 can be applied over the mesh also typically by fastening means such as clips 810. The mesh coverings 612, or 610, 612A, 612B and 616A to 616D or 710 in addition provide a frictional surface to minimize or prevent sliding of the object placed on the desktop frame structure 500. Typically, the object is a portable computer, but other objects as deemed suitable by the user can be accommodated also.

35 The embodiment has been described in terms of individual tees, crosses and members, suitable typically to be made of a plastic material to provide low weight, low cost and ease of assembly. In particular, as noted previously, the embodiment of FIGS. 1 through 8 is illustrated with two lateral or horizontal x-direction members and at least two transverse or vertical y-direction members to provide structural stability. That is, the x-direction members 520 and 524 intersect with y-direction member 510 by means of tee connections 534 and 536 while members 522 and 526 intersect with y-direction member 512 by means of connections 538 and 540. Those skilled in the art recognize that there are other configurations possible that can provide structural stability, such as a polygonal arrangement or configuration, for example a quadrilateral or triangular

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arrangement or configuration, or a curvilinear arrangement or configuration of the members in the x-y plane.

Those skilled in the art will recognize also that the present invention can be designed as in a unitary manner to provide uniform structures minimizing the number of connections and to provide smooth transitions.

In that regard, FIG. 9A is a plan view of the first alternate configuration of a second embodiment of the present invention showing a uniform integrated structure of the portable desk 900 of the present invention. Such a structure is typically, but not limited to, formed by a manufacturing process such as injection molding of a lightweight plastic material. Suitable plastics include, but are not limited to, acrylonitrile-butadiene-styrene (ABS) and ethylene vinyl acetate (EVA). The portable desk 900 is comprised of a frame 902 having a louvered configuration of ventilation openings 904 formed by a grating or matrix 906. The frame 902 has a front surface 924 and a rear surface 922. The frame 902 typically is comprised of transverse or vertical cross members 902V and lateral or horizontal cross members 902H for structural integrity. Those skilled in the art recognize that other arrangements or configurations of the frame 902 and cross members 902V and 902H, such as polygonal, for example, quadrilateral or triangular, or curvilinear arrangements or configurations in the x-y plane, can be provided as well to achieve structural integrity, or the frame 902 can be designed to exclude such cross members. At a position typically adjacent to the rear surface 922 preferably are at arm rest or wrist rest areas 908 on the left and right sides of the rear of the frame 902. The arm rest areas 908 typically are formed by a raised surface to minimize user fatigue, and can be recessed to project edges 920. The arm rest areas 908 and their optional edges 920 can be formed either integrally as part of the frame structure 902 or optionally as a separate piece joined to the frame structure 902 at a joint such as joint 908J which interfaces with the remainder of the frame structure 902. The joining of the arm rest areas 908 to the remainder of the frame structure 902 at joint 908J can be performed by well known means in the art such as by adhesion or mechanical joints. Right rear leg 910R and left rear leg 910L are positioned typically to provide stability during use. Each of the legs 910R and 910L are typically provided with foot pads 911R and 911L. A protrusion 912 at the front surface 924 is provided typically for at least one front leg 914. The front leg typically includes a horizontal stabilizer connector base 916 and optionally extenders 918L and 918R to increase stability during use. The optional extenders 918L and 918R can be, if desired, provided with optional telescoping extenders 918TL and 918TR, respectively, which permit the span of the extenders to be varied for further stability.

FIG. 9B is a plan view as viewed from the bottom of the first alternate configuration of the second embodiment of the present invention of FIG. 9A. Therefore, the view is reversed left-to-right as compared to FIG. 9A. FIG. 9B shows sockets or accessory attachment points which are an integral part of the frame 902. In particular, attachment points or bosses 926L, 926R, 928L and 928R serve multiple purposes, some of which are discussed later. In this first alternate configuration, the attachment

points or bosses **926L** and **926R** are for legs **910L** and **910R**, respectively. At least a third attachment point **926M** is preferably provided to enable positioning of *an accessory* in the vicinity of the rear surface **922**, which is discussed later.. At least a third attachment point or boss **928M** is provided typically on the bottom side of the protrusion **912**. The attachment points or bosses **930A** through **930D**, in the vicinity of the rear surface **922**, and the attachment points or bosses **930E** and **930F**, in the vicinity of the front surface **924** are provided typically to enable storage or transport or packing of the accessories or the legs such as **910L**, **910R**, **910TL** and **910TR**. The accessories are discussed later with respect to FIGS. **10A-10G** and **11A-11F**.

In addition, attachment points or bosses **946a**, **944a**, and **948a**, located near the center of the frame **902**, typically on the vertical member **902V** or at or near an intersection point between the vertical member **902V** and the horizontal position, permit a user to position a handle as close to the effective center of gravity of the frame **902** as possible. The effective center of gravity results from the combined weight and load distribution of the desk **900** and a typical load such as a portable computer. The attachment points or bosses **946a** and **944a** are analogous in function to the attachment points or bosses **546a** and **544a** of FIGS. **1** through **4A** of the first embodiment.

FIG. **9C** is an elevation view as viewed from the side of the of first alternate configuration of the second embodiment of the present invention of FIG. **9A**. In particular, the frame **902** is shown with the right rear leg **910R** and foot **911R** while the protrusion **912** is positioned on the front surface **924**. The raised surface of the arm rest or wrist rest **908** with the edge **920** is positioned in the vicinity of the rear surface **922**. In this case, an optional telescoping front leg portion **914T** is provided as part of front leg **914**. The connector base **916** and optional extenders **918L** and **918R** preferably have a circular or oval cross-section. In general, any one or all of the legs **910R**, **910L** and **914** can be provided with telescoping portions such as telescoping portion **914T**.

FIG. **9D** is an elevation view as viewed from the rear of the first alternate configuration of the second embodiment of the present invention of FIG. **9A**. In particular, FIG. **9D** illustrates the connector base **916** and optional extenders **918L** and **918R**.

Similarly, FIG. **9E** is a perspective view of the first alternate configuration of the second embodiment of the present invention of FIG. **9A**. Since all of the components are numbered identically as in FIGS. **9A** and **9B**, no additional discussion is provided here.

The second embodiment of the present invention as illustrated in FIGS. **9A** through **9E** show the portable desk of the first embodiment of FIGS. **1** through **8** formed in a unitary integral manner. In addition, the screen mesh **610** of FIG. **6A**, the screen mesh **612A** and **612B** of FIG. **6C**, the screen mesh **616A** through **616D** of FIG. **6C** can be applied as well on top of the grating or matrix **906** using the clips as would be obvious

to those skilled in the art and as illustrated in FIG. 8. Similarly, the covering 710 can be applied as well using the same method illustrated in FIG. 8.

FIG. 10A is a plan view of the second alternate configuration of the second embodiment of the present invention. The main difference between the first and second alternate configurations of the second embodiment is that in the second alternate configuration, the frame 902 is now in a transport mode enabled by wheels 940L and 940R. The wheels 940L and 940R are connected by axle portions 938L and 938R and to axle connecting members 936L and 936R. The axle members are discussed in more detail with respect to FIG. 10B which follows. The transport mode is further enabled in that the front leg 914 and the optional telescoping portion of the front leg 914 are now directed in the same plane as the frame 902 by means of a tee connection 934 in the protrusion area 912. The connector 916, which is connected to the front leg 914 or the optional telescoping portion of the front leg 914, acts as a handle for the user, thereby facilitating transport of the desktop 900 and the object such as a portable computer (not shown).

FIG. 10B is a plan view as viewed from the bottom of the second alternate configuration of the second embodiment of the present invention of FIG. 10A. The wheels 940L and 940R can be seen connected by axle members 938L and 938R to axle joints 936L and 936R. In turn, axle members 942L and 942R are also connected respectively to the axle joints 936L and 936R and are commonly connected to the central axle joint 936M. Of course, those skilled in the art recognize that different combinations or quantities of axle joints and connectors can be used as well. The tee connection 934 is shown with the projection of the tee accommodating the front leg 914 which, as noted previously, acts as a handle for transport, together with the telescoping portion 914T and handle 916, as discussed previously.

FIG. 10C is an elevation view of a portion of the second alternate configuration of the second embodiment of the present invention of FIG. 10A. In particular, FIG. 10C shows the wheel and axle members 940L, 938L, 936L, 942L, 936M, 942R, 936R, 938R and 940R, as being separated from the frame 902.

FIG. 10D is an elevation view of an alternate position of the portion of the second alternate configuration of the second embodiment of the present invention of FIG. 10A. In particular, FIG. 10D shows the wheels 940L and 940R separated from the axle members 936L, 942L, 936M, 942R and 936R. The axle connectors 936L, 936M and 936R each have attachment points 936PL, 936PM and 936PR, respectively for attachment of the axle connector and members to the frame 902.

FIG. 10E is an elevation view as viewed from the side of the second alternate configuration of the second embodiment of the present invention of FIG. 10A. In particular, the tee connection 934 is shown connecting the front leg 914, which acts as a handle for transport, together with the telescoping portion 914T and handle 916, at the front protrusion 912 so as to accommodate the frame 902.

FIG. 10F is an elevation view as viewed from the rear of the second alternate configuration of the second embodiment of the present invention of FIG. 10A. In particular, FIG. 10F shows the wheel and axle members 940L, 938L, 936L, 942L, 936M, 942R, 936R, 938R and 940R from the rear surface 922.

FIG. 10G is a perspective view of the second alternate configuration of the second embodiment of the present invention of FIG. 10A. All of the members are as previously identified in the discussion for FIGS. 10A through 10F, and will not be discussed further here.

FIG. 11A is a plan view of a third alternate configuration of the second embodiment of the present invention. In particular, the third alternate configuration enables a "2-wide" arrangement where two users can be sitting adjacent to each other while using the desktop 900. The only difference between the third alternate configuration and the first and second alternate configurations is that in the third alternate or "2-wide" configuration, the frame 902 is supported by the front leg 914 and optional telescoping portion 914T in the perpendicular or vertical position, as in the first alternate configuration of FIGS. 9A through 9E, while the axle connectors and members 936L, 942L, 936M, 942R and 936R are positioned without the wheels 940L and 940R, and the wheel connectors 938L and 938R, respectively. Horizontal extending elements 944L and 944R are now connected respectively to the connectors 936L and 936R so as to provide sufficient room for the two users to be seated each partially underneath the frame 902 of the desktop 900. The left and right legs 910L and 910R, and the corresponding base feet 911L and 911R, respectively, are now connected to the horizontal extending elements 944L and 944R by means of connecting elbows 946L and 946R, respectively.

FIG. 11B is a plan view as viewed from the bottom of the third alternate configuration of the second embodiment of the present invention of FIG. 11A. In particular, FIG. 11B shows the axle connectors and members 936L, 942L, 936M, 942R and 936R positioned across the bottom surface of the frame 902 without the wheels 940L and 940R, and the wheel connectors 938L and 938R, respectively. As noted previously, the left and right legs 910L and 910R, and the corresponding base feet 911L and 911R, respectively, are now connected to the horizontal extending elements 944L and 944R by means of connecting elbows 946L and 946R, respectively.

FIG. 11C is a perspective view of the third alternate configuration of the second embodiment of the present invention of FIG. 11A. In particular, FIG. 11C shows the span from left leg 910L to right leg 910R. All of the remaining components shown are the same as in FIG. 11A and 11B.

FIG. 11D is a perspective view as viewed from the bottom of the third alternate configuration of the second embodiment of the present invention of FIG. 11C. FIG. 11D shows the same components as FIGS. 11A through 11C.

FIG. 11E is an elevation view as viewed from the rear of the third alternate configuration of the second embodiment of the present invention of FIG. 11A. In particular, FIG. 11E shows the view from the rear surface 922 of the "2-wide" configuration. The components are the same as shown in FIGS. 11A through 11D.

5 FIG. 11F is an exploded view of a portion of the third alternate configuration of the second embodiment of the present invention of FIG. 11A. Specifically, FIG. 11F shows the axle connectors and members 936L, 942L, 936M, 942R and 936R, the left and right legs 910L and 910R, and the corresponding base feet 911L and 911R, respectively, connected to the horizontal extending elements 944L and 944R by means of connecting elbows 946L and 946R, respectively. All of these components are shown in exploded form. The axle portion comprises the axle connectors and members 936L, 942L, 936M, 942R and 936R.

15 As is the case for the first alternate configuration of FIGS. 9A through 9E, for the second alternate configuration and the third alternate configuration of FIGS. 10A through 10G and FIGS. 11A through 11F, the screen mesh 610 of FIG. 6A, the screen mesh 612A and 612B of FIG. 6C, the screen mesh 616A through 616D of FIG. 6C can be applied as well on top of the grating or matrix 906 using the clips as would be obvious to those skilled in the art and as illustrated in FIG. 8. Similarly, the covering 710 can be applied as well using the same method illustrated in FIG. 8.

25 A fourth alternate configuration suitable for situations such as where the user is seated in a confined space such as an automobile and desires to rest the front leg 914 and optional telescoping portion 914T and handle 916 on the top of a flat surface is seated partially under the frame 902 can be provided. The fourth alternate configuration is analogous to the configuration of FIG. 3. Again the screen mesh can be applied as discussed previously.

30 FIG. 12A is a perspective view of a third embodiment of the present invention. The desk top frame structure 902 is the same as that illustrated in FIG. 9A through 11D previously and so some of the details are being omitted from the discussion as having already been discussed previously. FIG. 12B is a perspective view of a detail of the third embodiment of the present invention of FIG. 12A.

35 Referring to both FIGS. 12A and 12B, the difference is now that, in addition to the axle joints 936L, 936M and 936R and axle members 942L and 942R, the desk top frame structure 902 is now provided with additional joints 948L and 948R which are joined to an axle member 948. The joints 948L and 948R each include attachment points 948PL and 948PR which enable attachment to the frame structure at attachment points or bosses 928L and 928R of FIG. 9B. Similarly, the joints 936L, 936M and 936R are attached to the attachment points or bosses 926L and 926R of FIG. 9B.

45 The purpose of the third embodiment is to enable a user to support the frame structure 902 by the user's own body typically from his or her shoulders typically while

- standing by means of shoulder straps (not shown) or from a surface that is at least above the user's mid-section or typically above the user's head typically while standing that is other than the floor on which the user is located. Therefore, the joints 948L and 948R and the joints 936L and 936R are now provided with support elbows 950FR, 950FL, 950RL and 950RR, respectively. Each of the support elbows 950FR, 950FL, 950RL and 950RR includes a ring or other engagement means 952FR, 952FL, 952RL and 952RR, respectively, to enable attachment of the shoulder straps or other support means to enable the user to support an object on top of the frame structure 902 without directly relying on the floor for support.
- FIG. 12C is perspective view of a detail of the third embodiment of the present invention of FIG. 12B, and shows in detail the support elbows 950FR, 950FL, 950RL and 950RR including the ring or other engagement means 952FR, 952FL, 952RL and 952RR, respectively. Those skilled in the art recognize that there are numerous connection means or engagement means to supporting mechanisms that enable support of the desk top frame structure without directly relying on the floor for support. These include but are not limited to male and female type connections, either threaded or unthreaded as examples.
- The invention has now been explained with reference to specific embodiments. Other embodiments will be apparent to those of ordinary skill in the art in view of the foregoing description. It is not intended that this invention be limited except as indicated by the appended claims and their full scope equivalents.